Intel X710 10 GbE SFP+ Network Adapter Family

IBM Redbooks Product Guide

Introduction

The new Intel X710 family of 10 Gigabit Ethernet (GbE) server network adapters addresses the demanding needs of the next-generation data center. By providing unmatched features for server and network virtualization, small packet performance, and low power; the data center network is flexible, scalable, and resilient.

The X710 is available in standard PCIe low-profile card form factor with two 10 GbE ports or mezzanine card ML2 form factor with four 10 GbE ports. The following figure shows the Intel X710 2x10GbE SFP+ Adapter for IBM System x.

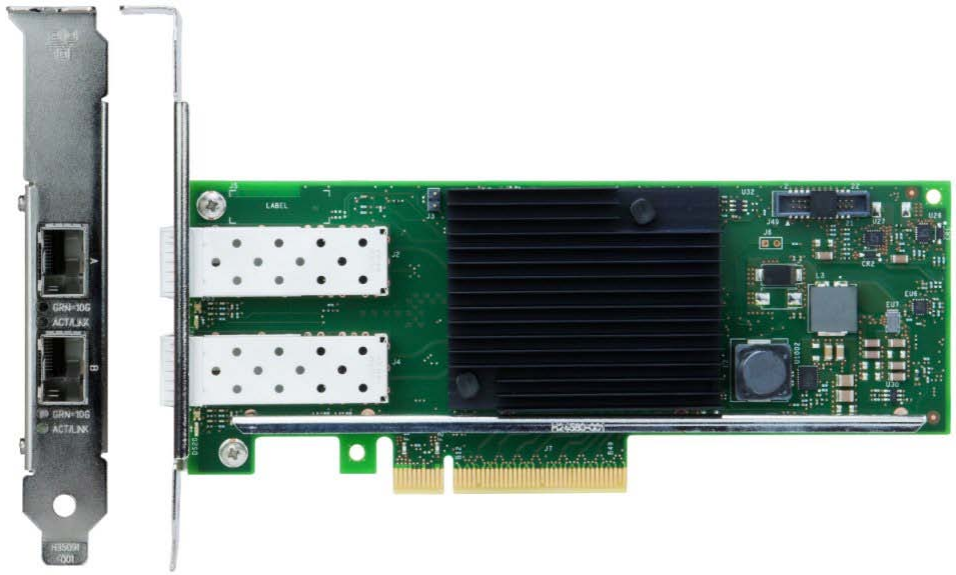

Figure 1. Intel X710 2x10GbE SFP+ Adapter for IBM System x

Did you know

The Intel X710 adapters support Intel I/O Virtualization Technology, which helps accelerate data and improves application response times. For virtualized environments, the X710 adapters offer advanced features with VMDq that lower processor usage and increase I/O performance.

Mezzanine LAN-on-Motherboard Generation 2 (ML2) is a cost-effective adapter form factor for System x servers that offers the flexibility advantages of a PCIe adapter while supporting integrated networking features, such as Wake-on-LAN and direct connectivity to the server's IMM2 service processor for out-of-band systems management.

Part number information

The following table provides the ordering part numbers and feature codes for the Intel X710 adapters.

Table 1. Ordering part numbers and feature codes

Part number	Feature code	Description
81Y3520	AS73	Intel X710 2x10GbE SFP+ Adapter for IBM System x
94Y5200	AS74	Intel X710 ML2 4x10GbE SFP+ Adapter for IBM System x

The adapter option part numbers includes the following items:

- One Intel 10 Gb Ethernet adapter
- 3U bracket attached with 2U bracket included in the box
- Quick Install Guide
- Warranty Flyer
- Documentation CD
- Important Notices Flyer

Note: The adapters ship without any SFP+ transceivers or direct attach cables. These items must be ordered separately (for more information, see Table 2 and Table 3).

The following figure shows the Intel X710 ML2 4x10GbE SFP+ Adapter with the 3U bracket attached.

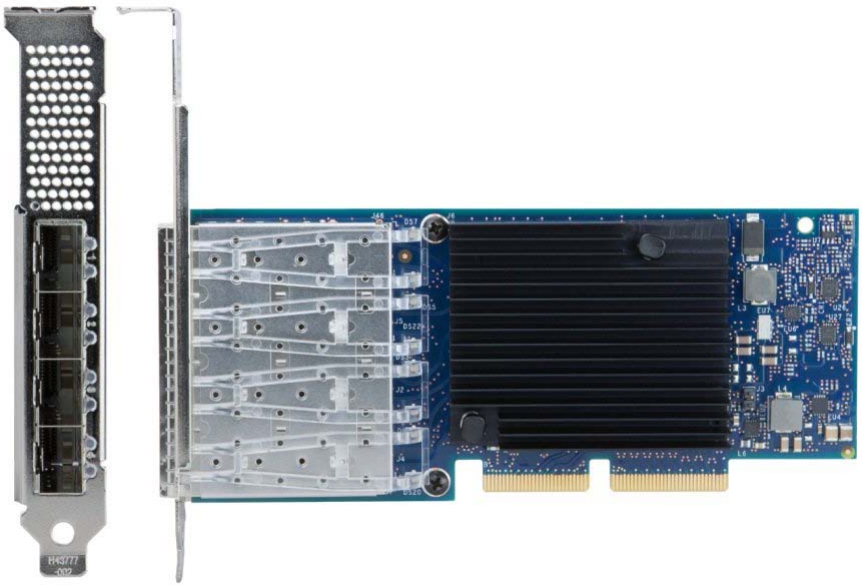

Figure 2. Intel X710 ML2 4x10GbE SFP+ Adapter for IBM System x

Supported transceivers and direct-attach cables

The Intel X710 adapters have two empty SFP+ cages that support SFP+ SR transceivers and direct attached copper (DAC) cables, as listed in the following tables.

Table 2. Supported SFP+ transceivers

Part number	Feature code	Description
Optical Transceivers		
49Y4216	0069	Brocade 10Gb SFP+ SR Optical Transceiver
46C3447	5053	IBM SFP+ SR Transceiver (10Gb)
49Y4218	0064	QLogic 10Gb SFP+ SR Optical Transceiver

Table 3. Supported direct attach cables

Part number	Feature code	Description
Active DAC/Twinax cables		
95Y0323	A25A	1 m IBM Active DAC SFP+ Cable
95Y0326	A25B	3 m IBM Active DAC SFP+ Cable
95Y0329	A25C	5 m IBM Active DAC SFP+ Cable
Passive DAC/Twinax cables		
00D6288	A3RG	.5 m IBM Passive DAC SFP+ Cable
90Y9427	A1PH	1 m IBM Passive DAC SFP+ Cable
00AY764	A51N	1. 5m IBM Passive DAC SFP+ Cable
00AY765	A51P	2m IBM Passive DAC SFP+ Cable
90Y9430	A1PJ	3m IBM Passive DAC SFP+ Cable
90Y9433	A1PK	5m IBM Passive DAC SFP+ Cable
00D6151	A3RH	7 m IBM Passive DAC SFP+ Cable

Features

The Intel X710 adapters are optimized for data center, cloud, and mobile applications and include the following features:

- VXLAN/NVGRE Hardware Offloads: These stateless offloads preserve application performance for overlay networks. With these offloads, it is possible to distribute network traffic across CPU cores. At the same time, X710 offloads LSO, GSO, and checksum from the host software, which reduces CPU overhead. (VXLAN and NVGRE support is planned for 1Q/2015)

- Mobile and cloud application acceleration: Intel's Data Plan Development Kit (DPDK) delivers an open driver where users can fine-tune small packet performance, which delivers line-rate at 128 byte, and near line-rate at 64 byte.

- Low latency: Intel Ethernet Flow Director delivers hardware-based application steering and Intel Data Direct I/O makes the processor cache the primary destination and source of I/O data rather than main memory. Combined, latency is reduced and Intel reports a three-fold improvement in RPS.

- Virtualization performance: With Intel Virtualization Technology (VT), the X710 family of adapters delivers outstanding I/O performance in virtualized server environments. These adapters reduce I/O bottlenecks by providing intelligent offloads for networking traffic per virtual machine (VM), which enables near-line rate speeds for small packets and supports almost an unlimited amount of isolated traffic flows so that you can scale your cloud environment.

- Next-generation VMDq: The X710 adapters support up to 256 VMDq VMs and offer enhanced Quality of Service (QoS) feature by providing weighted round-robin servicing for the Tx data. The adapters offload the data-sorting functionality from the hypervisor to the network silicon, which improves data throughput and CPU usage.

- PCI-SIG SR-IOV implementation: Provides an implementation of the PCI-SIG standard for I/O Virtualization. The physical configuration of each port is divided into multiple virtual ports. Each virtual port is assigned to an individual VM directly by bypassing the virtual switch in the Hypervisor, which results in near-native performance.

- VM load balancing: Provides traffic load balancing (Tx and Rx) across VMs that are bound to the team interface. It also provides fault tolerance if a switch, port, cable, or adapter fails.

The Intel X710 adapters have the following features and specifications:

- Form factor:
  - PCIe x8 low profile card small form factor (PCIe adapter, part number 81Y3520)
  - PCIe x8 Mezzanine LOM Generation 2 (ML2) form factor (ML2 adapter, part number 94Y5200)
- Empty SFP+ cages for 10GbE connection supporting SFP+ transceivers or DAC cables
- Host interface:
  - PCI Express 3.0; x8
  - PCI Power Management/ACPI Extensions
  - TLP Processing Hint (TPH) Support
  - MSI-X Support
  - Energy Efficient Ethernet
- Performance:
  - Achieves wire-rate throughput on smaller payload sizes (>64 bytes)
  - Standard stack Latency: ~7 µs
  - Kernel- Bypass Latency: ~3 µs
  - Small Packet Developers Tool Kit
- Virtualization features:
  - Microsoft Network Virtualization that uses Generic Routing Encapsulation (NVGRE) (planned for 1Q/2015)
  - VMware Virtual Extensible LAN (VXLAN) (planned for 1Q/2015)
  - Intel Virtual Technology (VT) with VMDq for virtualization
  - SR-IOV direct assignment support
  - Virtual Bridging Support: VEPA/802.1Qbg, BPE/802.1Qbh
  - Virtual Functions: Up to 128 per device
  - Hardware Queue Pairs: Up to 1.5K

- Management features:
  - Advanced filtering capabilities (IPv4, IPv6)
  - SNMP
  - RMON statistic counters
  - Wake on LAN support (ML2 adapter only; first port only)
  - NC-SI for IMM shared management port connectivity through port 1 (ML2 adapter only)
- Additional features:
  - Jumbo Frame Support: 9728 bytes
  - VLAN support
  - Flow Control
  - 1588 Time Synchronization Support
- TCP/IP Layer 2 features:
  - Receive Side Scaling (RSS)
  - Large Send Offload (LSO)
  - TCP/UDP/IP/SCTP Checksum Offload
  - IPv4, IPv6
- IEEE 802.1Q VLAN support with VLAN tag insertion, with stripping and packet filtering for up to 4096 VLAN tags.
- IEEE 802.3x flow control support.
- IEEE 802.1p Class of Service (CoS)/QoS.
- Support for Advanced Packet Filtering.
- Teaming support:
  - Adapter Fault Tolerance (AFT)
  - Switch Fault Tolerance (SFT)
  - Adaptive Load Balancing (ALB)
  - VM Load Balancing (VMLB)
  - IEEE 802.3ad (link aggregation control protocol)
- Intel PROSet Utility for easy configuration and management.
- UEFI and legacy PXE boot
- Option ROM:
  - PCIe adapter: Disabled on both ports by default.
  - ML2 adapter: Enabled on all ports by default.
- RoHS compliance that is based on latest 2014 standards.

Standards supported

The X710 adapters support the following IEEE standards:

- IEEE 802.1p CoS traffic prioritization
- IEEE 802.1Q VLAN tagging
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.3x Full-duplex flow control
- IEEE 802.3ae 10GBASE-SR short range fiber optics 10 Gb Ethernet
- 10GSFP+Cu SFP+ Direct Attach copper
- IEEE 1588, 802.1as Time Sync

Supported servers

The Intel X710 adapters are supported on the IBM System x servers that are listed in the following table.

Table 4. Server compatibility, part 1 (M5 systems with v3 processors)

Part number	Description	x3100 M5 (5457)	x3250 M5 (5458)	x3550 M5 (5463)	x3650 M5 (5462)	nx360 M5 (5465)	nx360 M5 DWC (5467)
81Y3520	Intel X710 2x10GbE SFP+ Adapter	N	Y	Y	Y	Y	N
94Y5200	Intel X710 ML2 4x10GbE SFP+ Adapter	N	N	Y	Y	N	N

Table 4. Server compatibility, part 2 (M4 and X6 systems with v2 processors)

Part number	Description	x3500 M4 (7383, E5-2600 v2)	x3530 M4 (7160, E5-2400 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3650 M4 HD (5460)	x3750 M4 (8752, E5-4600 v2)	x3850 X6/x3950 X6 (3837)	dx360 M4 (7912, E5-2600 v2)	nx360 M4 (5455)
81Y3520	Intel X710 2x10GbE SFP+ Adapter	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
94Y5200	Intel X710 ML2 4x10GbE SFP+ Adapter	N	N	N	N	N	N	N	Y	Y	N	N

Table 4. Server compatibility, part 3 (M4 and X5 systems with v1 processors)

Part number	Description	x3100 M4 (2582)	x3250 M4 (2583)	x3300 M4 (7382)	x3500 M4 (7383, E5-2600)	x3530 M4 (7160)	x3550 M4 (7914, E5-2600)	x3630 M4 (7158)	x3650 M4 (7915, E5-2600)	x3690 X5 (7147)	x3750 M4 (8722)	x3850 X5 (7143)	dx360 M4 (7912, E5-2600)
81Y3520	Intel X710 2x10GbE SFP+ Adapter	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
94Y5200	Intel X710 ML2 4x10GbE SFP+ Adapter	N	N	N	N	N	N	N	N	N	N	N	N

For more information about the System x servers that support this adapter (including support for older servers), see IBM ServerProven® at this website:
http://ibm.com/servers/eserver/serverproven/compat/us/

Network cabling requirements

The network cables that can be used with the adapters are described in the following sections.

- 10GBASE-SR (supported with the optional 10 GbE SFP+ SR transceivers listed in Table 2)

  850 nm communication that uses multimode fiber cable (50 µ or 62.5 µ) up to 300 m that uses an LC duplex connector

- 10GSFP+Cu (supported with the optional SFP+ DAC cables listed in Table 3)

  Up to 5 m SFP+ copper direct attach cables, as listed in Table 3

Supported operating systems

The Intel X710 10 Gb Ethernet adapters support the following operating systems:

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2012
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 7

For more information about the specific supported versions and service packs, see IBM ServerProven at this website:
http://ibm.com/servers/eserver/serverproven/compat/us/

At the website, click **System x servers**, and then click **LAN** to see the support matrix. Select the check mark that is associated with the System x server in question to see the operating system support information.

Physical specifications

The physical specifications of the adapters are described in this section.

The Intel X710 2x10GbE SFP+ Adapter has the following dimensions:

- Length: 168 mm (6.6 in.)
- Width: 69 mm (2.7 in.)
- Height: 15 mm (0.6 in.)

The Intel X710 ML2 4x10GbE SFP+ Adapter has the following dimensions:

- Height: 69 mm (2.7 in.)
- Length: 168 mm (6.6 in.)
- Width: 17 mm (0.7 in.)

The adapters have the following shipping box dimensions (approximate):

- Length: 238 mm (9.4 in.)
- Width: 143 mm (5.6 in.)
- Height: 51 mm (2.0 in.)

Operating environment

These adapters are supported in the following environment:

- Operating temperature: 0 - 55 °C (32 - 131 °F)
- Storage temperature: -20 - 65 °C (-4 - 149 °F)
- Shipping conditions: -20 - 70 °C (-4 - 158 °F)
- Air flow requirement (LFPM): 45 minimum
- Wet bulb (max): 27 °C (81 °F)
- Relative humidity (operating/nonoperating): 10% - 90%
- Relative humidity (shipping): 5% - 95%, no condensation
- Relative humidity (storage): 5% - 80%
- Maximum dew point (operating): 21 °C (70 °F)
- Maximum operating altitude: 7,000 feet (2,134 m)
- Vibration and shock: IEC 68, FCC Part 68.302, NSTA, 1A
- Electrostatic/electromagnetic susceptibility: IEC 801-2, -3, -4, and -5

Warranty

One-year limited warranty. When installed in a System x server, these adapters assume your system's base warranty and any IBM ServicePac® upgrade.

Agency approvals

The adapters conform to the following standards:

- EN55022
- EN55024
- EN60950 / CE
- EN 61000-3-2
- EN 61000-3-3
- ICES-003, Issue-004
- IEC 950 CB Scheme
- FCC 47 CFR Part 15 Class A
- UL 1950
- CSA C22.2 950-95
- VCCI
- AS/NZS CISPR 22 / C-tick
- RRL for KC
- BSMI
- UL 94-/V

Top-of-rack Ethernet switches

The Intel X710 adapters support end-to-end 10 GbE connections to the top-of-rack Ethernet switches from IBM System Networking that are listed in the following table.

Table 5. IBM System Networking: Top-of-rack switches

Part number	Description
7309DRX	IBM System Networking RackSwitch G8264CS (Rear-to-Front)
7309DFX	IBM System Networking RackSwitch G8264CS (Front-to-Rear)
7309BR6	IBM System Networking RackSwitch G8124ER
7309BF7	IBM System Networking RackSwitch G8124EF
7309G64	IBM System Networking RackSwitch G8264R
730964F	IBM System Networking RackSwitch G8264F

For more information, see the IBM Redbooks® Product Guides in the top-of-rack switch category, which is available at this website:
http://www.redbooks.ibm.com/Redbooks.nsf/portals/systemx?Open&page=pg&cat=tor

Popular configurations

The following figure shows Intel 10 Gb Ethernet adapters that are installed in a supported rack server. The servers are connected to a 10 Gb Ethernet network by using a pair of 10 Gb Ethernet switches.

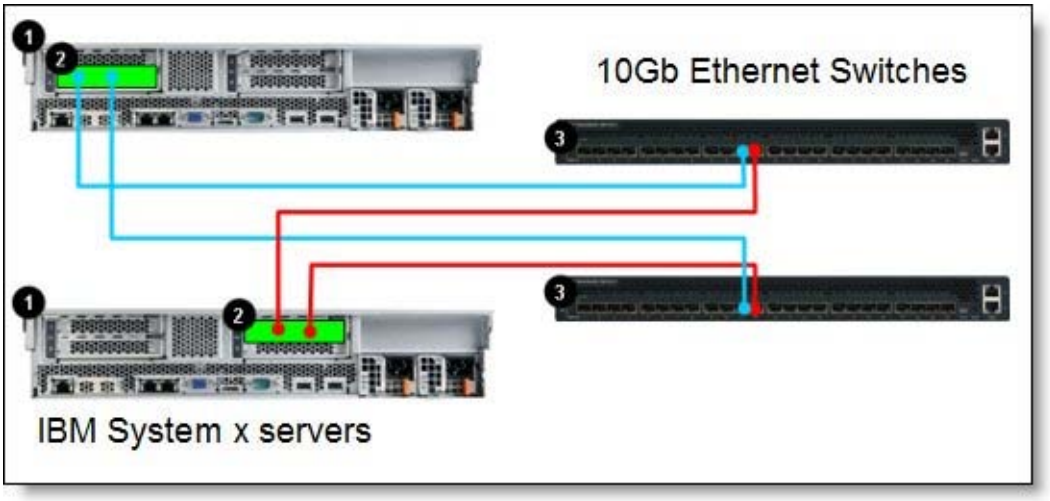

Figure 3. Popular configuration

The parts used are listed in the following table.

Table 6. Components used with the Intel 10 GbE adapters (Figure 3)

Diagram reference	Part number / machine type	Description	Quantity
1	Varies	Supported server (See Table 5)	2
2	Varies	Intel 10 Gb Ethernet Adapter (See Table 1)	2
2	Varies	Supported 10 Gb SFP+ Transceivers or direct-attach cables (See Tables 2 and 3)	4
3	Varies	10 Gb Ethernet Switch (See Table 6)	2

Related publications

For more information, see the following resources:

- IBM US Announcement Letter:
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS114-190
- System Networking Product Catalog
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=FY&htmlfid=QCF12363USEN
- *IBM System x Configuration and Options Guide*:
  http://ibm.com/systems/xbc/cog/
- Intel site for IBM Ethernet adapters:
  http://www.intelethernet-ibm.com/

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